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ABSTRACT

Traditionally, library instruction has been based on the sources in the library and not on the process of seeking information. A new approach to library skills may be needed to enable students to become effective information users. This study investigated the information search process of 140 high school seniors in six high schools. Subjects were identified as high, middle, and low achievers from homogeneously grouped English classes. Findings verify a six-stage model of thoughts, actions, and feelings in the information search process. There was a significant change in students' thoughts, actions, feelings, and confidence during an information search which correlated with the teachers' assessment of focus in the students' papers and grades on the papers. Five tables are appended. (11 references) (Author/SD)

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THE INFORMATION SEARCH PROCESS OF HIGH, MIDDLE, AND LOW ACHIEVING HIGH SCHOOL SENIORS

Traditionally, library instruction has been based on the sources in the library. One of the underlying problems resulting from this approach is the apparent inability of incoming college students, even those who have had prior library instruction, to use academic libraries. In addition, information industries are noting that people are not able to take full advantage of emerging information technologies because of a lack of information literacy. A new approach to library skills instruction maybe needed to enable students to become effective information users. Some theorists attribute difficulty in the transference of library skills to the heavy emphasis in instructional programs to source orientation and to a lack of attention to the process of information seeking. A process approach to library instruction requires an understanding of different stages of information need as a search progresses and strategies for using information to learn within each stage.

The investigation of the process approach to library instruction builds on my dissertation study. In an initial, exploratory study a six-stage model of the thoughts, actions and feelings common in the search process was developed which is described in my book, Teaching the Library Research Process and in an article in SLMQ Winter 1985. In 1986, two longitudinal studies explored changes in perceptions of library research of 26 students from high school through college and the characteristics of six successful searchers using the case study method over a four year period. Two large scale studies were conducted in 1988 to verify the results of these small, more qualitative studies.

This study investigated the information search process of 140 high school seniors in six high schools. Subjects were identified as high, middle, or low achievers by their scores on national standardized tests, grade point average and assignment to homogeneously grouped English classes. Findings confirmed the model and showed that there was a significant change in students' thoughts, feelings and confidence during the information search process. There was no significant difference between the search process of the high and middle achievers. However, data collected from the low achieving students was incomplete and could not be statistically analysed.

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Introduction

The information age offers great promise for access to information for all people while at the same time threatening to overwhelm even the most literate by the sheer volume of indiscriminate facts. What constitutes literacy has been a hotly debated issue, and the question of what it means to be literate in the information age is far from being resolved. The American Library Association President's Committee on Information Literacy reports that information literacy encompases an ability to find meaning from the masses of information continually bombarding us through our electronic technologies; ability to identify when we need to know more about something and how to find what we need to know; ability to learn from information once we have found it. Ability to think, decide, and learn through the use of information is an essential skill in an information society. 1

To design learning environments in our schools that prepare children to use information for finding meaning, thinking, deciding and learning throughout their lives, traditional practices need to be restructured. In the information age school, the library media center becomes an information center which operates as a laboratory for learning how to learn from a great variety of information. 2 Information use arises naturally out of the questions raised across the curriculum, in contrast with traditional library research paper assignments which are often "add-on" activities with little integration with essential skills and engaging questions. Commonly, after a research paper

is assigned, students are left on their own with perhaps a brief orientation on how to locate and use sources but with little guidance in the complex learning process in which they will be involved. In this way opportunities for learning how to learn through information are often lost. There is a need to study the process of learning from information in order to design effective learning environments for the information age.

Background

The problem being addressed in this research is that traditionally library instruction has been oriented to teaching the sources in the library and not to the process of information seeking. However, there is much more going on in the information search process than the location and use of sources. Traditional instruction does not take into account the dynamic learning process in which students are involved in an information search.

In 1983, I conducted an exploratory study to learn more about students' experiences within the information search process. Twenty-four competent high school seniors were studied over a ten month period using the qualitative methods of journal keeping, short pieces of writing, interviews, observations and other naturalistic techniques. As a result, a model of the search process was developed describing thoughts, actions, and feelings commonly experienced in six stages.3 This research is based on the premise that an information search is a process of construction in which a person moves from uncertainty to confidence as described in Kelly's personal construct theory and

on the work of Belkin and his colleagues' concerning an anomalous state of knowledge.4,5

It is closely related to the research into the writing process, particularly the work of Emig.6 The information search process is the prewriting stage of the writing process which is a thought-developing phase in preparation for presenting. The presentation stage of the information search process merges with the starting phase of the writing process.

According to the model, the search process is made up of six stages - Initiation, Selection, Exploration, Formulation, Collection, and Presentation - in which thoughts move from vague and unclear to a focused point-of-view and feelings change from uncertainty and confusion to increased confidence. At Initiation, when a research assignment is announced by the teacher, students often feel apprehensive of the task ahead and uncertain of what is expected of them. They think of possible topics in preparation for the second stage, Selection, when they actually choose a topic to develop. The third stage, Exploration, is often the most difficult for students, with confusion and doubt mounting until a focus begins to emerge in the Formulation stage. After students have learned about their topic from the information they encounter and have formed a personal perspective or focus on the topic, they proceed more confidently to the fifth stage, Collection, in which they gather facts about their focus and the sixth stage, Presentation, in which they share what they have learned with others.7,8 The

model was verified in two longitudinal studies with the same sample of students. 9,10

Further verification was sought with a larger sample of high school seniors from three different levels of academic performance, and the results of that study are reported here. The following questions are addressed: Do other high achievers experience a similar process? Do low and middle achieving students experience a similar process?

Research Method

The sites selected for the study were six high schools in New Jersey representing a diverse population both urban and suburban, distributed in different counties across the state. Low, middle, and high achieving seniors in homogeniously-grouped English classes were selected on the basis of their grade point averages and scores according to national percentiles on a standardized test. The sample was limited to seniors in English classes, as was the sample in the prior studies.

Three levels of homogenious groups were identified by the average overall class score on a standardized test according to established national percentiles. The following range was used: High - 80% and above; Middle - 40% to 79%; and Low - 39% and below. There were 147 participants: 34 in the group identified as high achievers, 73 medium level, and 40 of the lower level achievers.

Each participant was assigned an English paper requiring library research on a topic of his or her choice related to the

course. The paper was limited to five pages, but the number and variety of sources were not specified. The project was to be completed in four weeks, during which time the librarians at each site gave predesigned instruction on the search process taken from Teaching the Library Research Process.11 Instruction consisted of five sessions, two at the beginning (Initiation), two in the middle (Midpoint), and one toward the end (Closure).

The librarians also administered a process survey during these sessions at Initiation, at Midpoint, and again at Closure. The survey was made up of six questions, the first four related to thoughts (name the source you are using; what are you looking for; state the title of your project; and what is your topic about) and the last two related to feelings (rate your confidence level using a scale of 1 to 10 and write three adjectives describing how you feel).

Two members of the research team coded the responses to the questions related to thoughts as follows: 1 for general or background thoughts, 2 for more specific ideas or narrowing of the general topic, and 3 for a focused perspective or personal point-of-view. A Thoughts Index was derived from an additive of the aggregate scores which ranged from a minimum of 4 to a maximum of 12. The scores were then tested for significant change at the three points in the search process using t Tests at $p<.01$.

From the responses to the questions related to feelings a Confidence Scale, ranging from a low of 1 to a high of 10, was

produced. The confidence level was compared at the three points in the search process to determine significant changes using t Tests at $p<.01$. The three adjectives most frequently listed by participants were considered as indicative of their feelings at each of the three points.

In addition, the teachers assessed each student paper for evidence of focus and grasp of subject on a scale of 1 (low) to 5 (high) and also listed the number and variety of sources cited in the bibliography. The grades given to the papers by the teachers were also collected. Changes in confidence level as found in the process surveys were then compared to the teachers' assessments to determine if there were significant correlations using Pearson product-moment measures and analysis of variance at $p<.05$.

Findings

The lower achieving students proved to be a difficult group to track because of their frequent absenteeism and therefore had to be dropped from the study. While it was possible to collect a single process survey from most of these participants, it was not possible to collect a sufficient number of second and third surveys to provide a basis for comparison. However, this group was able to use the instruments and warrants a further study designed to compensate for such erratic attendance.

There were no significant differences between the high and middle level students on any of the variables when measured by t Tests with one notable exception. The higher achieving students received somewhat higher grades, with a mean of 7.4 than did the

middle level students with a mean of 6.0. The grading scale used was: 12 - A+, 11 - A, 10 - A-, 9 - B+, 8 - B, 7 - B-, 6 - C+, 5- C, 4 - C-, 3 - D+, 2 - D, 1 - D-, 0 - F.

The Thoughts Index revealed a pattern of change for both the middle and high achieving students in the study. At Initiation 64% of the students' responses were found to reveal thoughts about the general topic dealing with background information, with only 25% showing more specific thinking and less than 1% at the focused level (10% missing cases). At Midpoint only 25% of the thoughts were identified as addressing the general topic and 15% of these were at the upper range of that general category. However, 60% of the responses at Midpoint revealed more specific thinking and showed evidence of narrowing the general topic, and 8% were at the focused level (7% missing cases). At Closure, only 11% of the responses revealed thoughts about the general topic, while 39% showed narrowing of the topic and 33% revealed a focused perspective of the topic (17% missing cases).

Participants' thoughts changed during the search process from general and background at Initiation, with a mean of 5.89, to specific and narrowed at Midpoint, with a mean of 7.20, to clearer and focused at Closure, with a mean of 8.52. A single tailed t Test showed significant differences in means from Initiation to Midpoint and Midpoint to Closure at $p<.001$. Table 1 shows that most responses were in the 4-6 (general) range at the Initiation of the search, in the 7-9 (specific) range at Midpoint and split between the 7-9 (specific) and 10-12 (focused)

range at Closure. These aggregate scores verify as the model predicted that thoughts move from general to specific to focused during the search process.

The Confidence Scale revealed a change in students' feelings during the search process. At Initiation 32% of the students responded that their confidence level was in the low range (1-4) with 46% in the middle range (5-7) and 15% in the high range (8-10), with the same number of missing cases as in the Thoughts Index. Viewed another way, 54% registered confidence in the lower half of the scale at 5 or below. At Midpoint, students reported their confidence to have risen somewhat but not significantly with 24% in the low range, 50% in the middle range and 22% in the high range. However, at this point the percentage of participants who registered their confidence in the lower half of the scale at 5 or below had dropped 10% to 44%. At Closure only 9% rated their confidence in the low range with 43% in the middle range and 41% identifying a rise in confidence to the highest range. At this point only 25% registered their confidence in the lower half of the scale. Table 2 shows the rise in students' confidence from Initiation to Midpoint to Closure. At Initiation the mean confidence level was at 5.37, which increased only slightly at Midpoint to 5.79 but significantly at Closure to 6.83. There was a significant gain in the confidence of the students from Initiation to Closure at $p<.001$.

An open question provided participants with an opportunity to elaborate on their feelings. The three most frequently named terms describing feelings were confused, tired, bored at Initiation, confident, confused, tired at Midpoint, and tired, confident, relieved at Closure. An examination of these responses reveals a change in feelings during the process. The confusion commonly experienced early on continued at Midpoint. However, at this time confidence began to increase, with confusion giving way to feelings of both confidence and relief by Closure. The terms bored and tired may indicate an overall sense of discontent with the task.

Table 3 depicts both change in thoughts and change in confidence during the search process, as shown by the means at Initiation, Midpoint, and Closure on the Thoughts Index and the Confidence Scale. While the change in confidence was not as pronounced as the change in thoughts, there was a significant gain in confidence from Initiation to Closure. This increase in students' confidence parallels evidence of clearer, more focused thoughts about the topic in an information search.

When the teachers' assessment of the students' papers was compared to the change in students' confidence, several significant correlations were noted. Table 4 shows that the rise in confidence had a slight positive correlation to evidence of a focus in the students' papers. Increased confidence also showed a slight positive correlation to the grade on the students' papers, as shown in Table 5. There was no correlation between

the number and variety of sources in students' bibliographies and their confidence level.

Discussion

These findings verify the model of the information search process with high and middle level seniors. Information seeking is a complex learning process in which thoughts evolve, feelings change and confidence rises. Confusion and lack of confidence are common in the early stages. Even when students know how to use the library and are familiar with sources, a lack of confidence can be expected in the early stages of a project requiring extensive information use. Library instruction which incorporates a process approach, enabling students to know what to expect, can help them work through the stages of information seeking and help them to learn from information.

Another important finding of the study is that there was some correlation between students' change in confidence during the search process and the teachers' assessment of their papers. Although correlation was slight, a rise in confidence which paralleled a move toward clearer thoughts resulted in more focused papers and the higher grades. On the other hand, it is also important to note that increase in confidence had no correlation with either the number or variety of sources. This finding indicates that total concentration on sources in instructional programs does not take into account the very essence of the search process, changes in thoughts. In the six stage model of the search, focus formulation is the pivotal point

when feelings shift from confusion to confident. Therefore, the way students experience the search process would be expected to affect the focus of their paper. Both evidence of focus and change in confidence would be present when students had learned from the information they encountered in the search process. Although causality can not be presumed from correlation, there is an indication that more attention needs to be given to the dynamic learning process involved in information seeking and use. Further research is warranted on the crucial question of the affect of process on product.

Further study is underway, funded by the US Department of Education, to investigate the search process of information users in three different types of libraries: academic, public and school. Preliminary findings indicate a similar process across types of library users.

The information search process is a complex series of stages involving feelings and thoughts as well as actions. Traditional library instruction has been based on teaching sources of information, while virtually ignoring the dynamic learning process involved in information use. In the information age school, on the other hand, instruction is based on the process of learning through a variety of information resources, preparing students for finding meaning, thinking, deciding and learning throughout their lives.

Jacqueline Boss and Robert Belvin, graduate students at Rutgers, School of Communication, Information, and Library Studies, served as research assistants for the study.

NOTES

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2. Information Power: Guidelines for School Library Media Programs (Chicago: American Library Association and Washington: Association for Educational Communications and Technology, 1988).

3. Carol C. Kuhlthau, "The Library Research Process: Case Studies and Interventions with High School Seniors in Advanced Placement English Classes Using Kelly's Theory of Constructs" (Ed.D. Diss., Rutgers University, 1983).

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5. Nicholas J Belkin, Helen M Brooks, and Robert N. Oddy, "ASK for Information Retrieval" Journal of Documentation 38: 61-71 (1982).

6. Janet A. Emig, The Composing Process of Twelfth Graders (Urbana, IL: National Council of Teachers of English, 1971).

7. Carol C. Kuhlthau, "A Process Approach to Library Skills Instruction," School Library Media Quarterly 13: 35-40 (Winter 1985).

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9. Carol C. Kuhlthau, "Longitudinal Case Studies of the Information Search Process of Users in Libraries," Library and Information Science Research 10: 257-304 (1988).

10. Carol C. Kuhlthau, "Perceptions of the Information Search Process in Libraries: A Study of Changes from High School Through College," Information Processing and Management 24: 419-427 (1988).

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Thoughts Index
N=107
Percentage Frequency
80
70
60
50
40
30
20
10
0
4-6 General
7-9 Specific
10-12 Focused
Initiation
Midpoint
Closure

Table 1

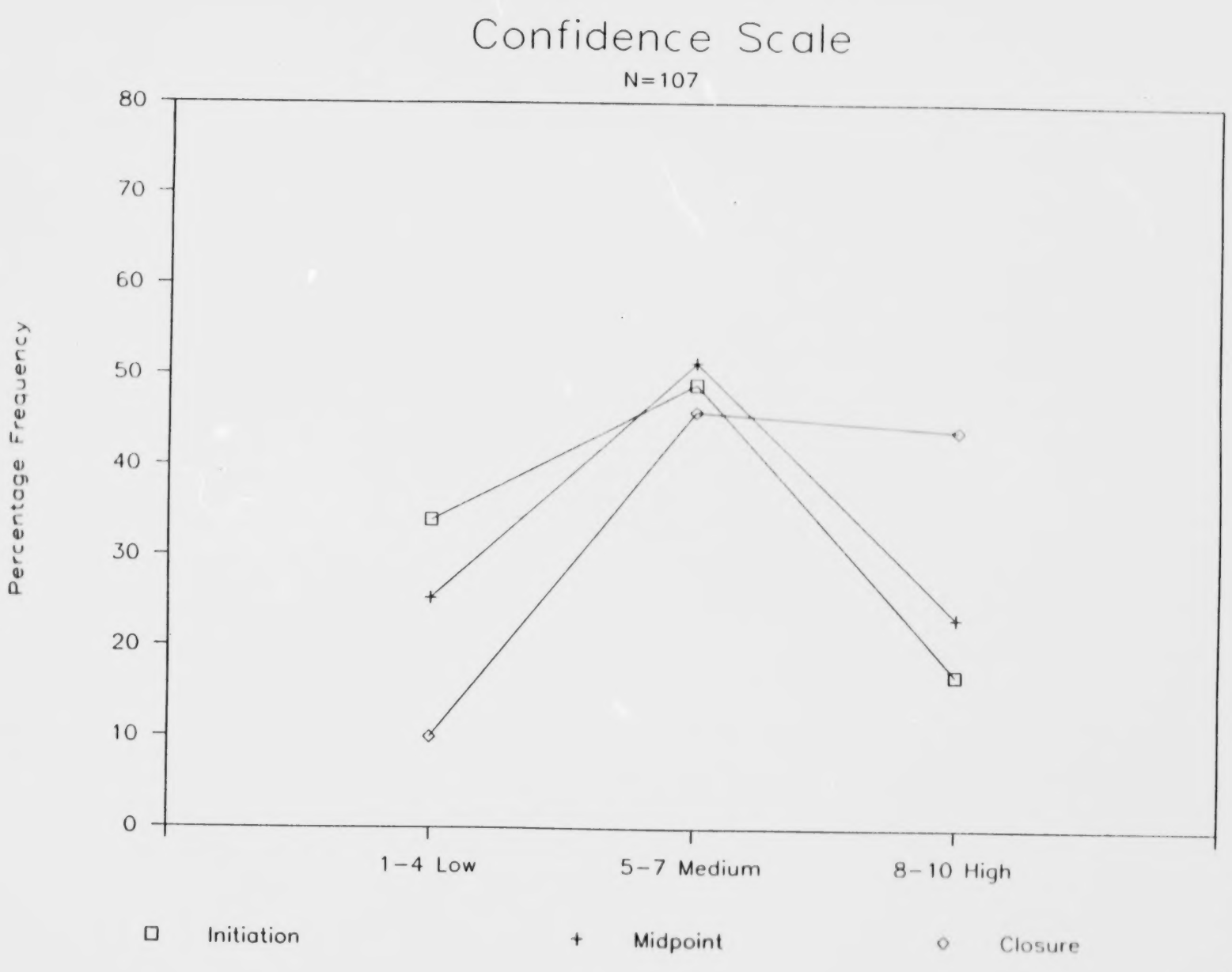
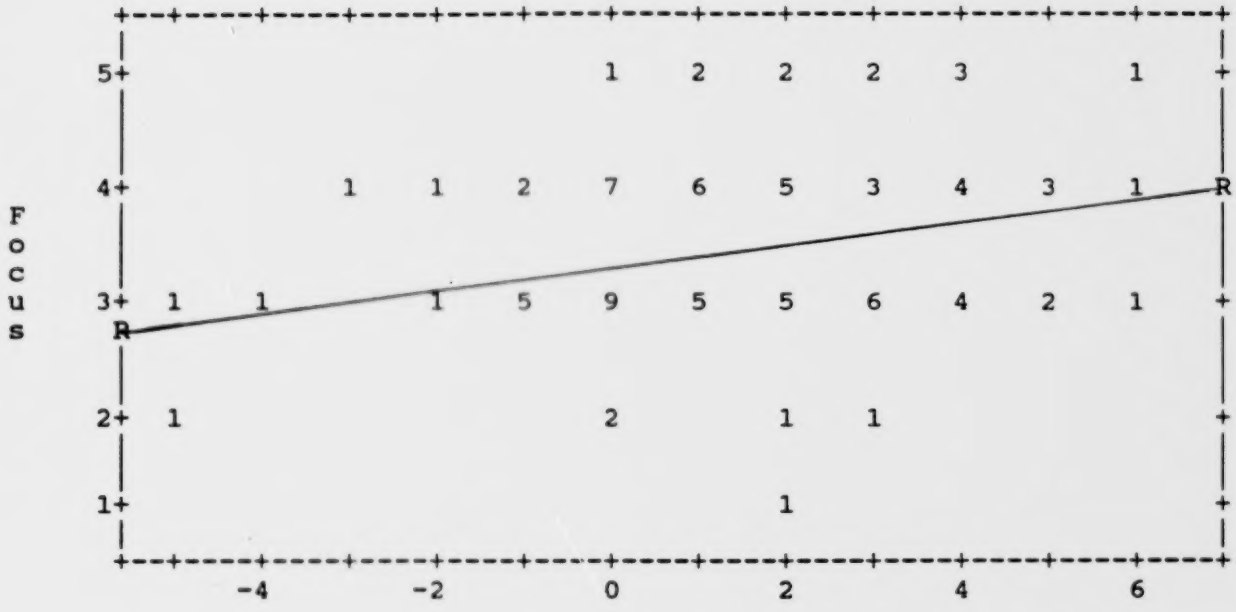

Confidence Scale
N=107
Percentage Frequency
80
70
60
50
40
30
20
10
0
1-4 Low
5-7 Medium
8-10 High
Initiation
Midpoint
Closure

Table 2

Change in Confidence and Thoughts
N=107
12
11
10
9
8
7
6
5
4
Means
Initiation
Midpoint
Closure
Confidence Scale
Thoughts Index

Table 3

Change in Confidence Related to Focus



Change in Confidence
N=90

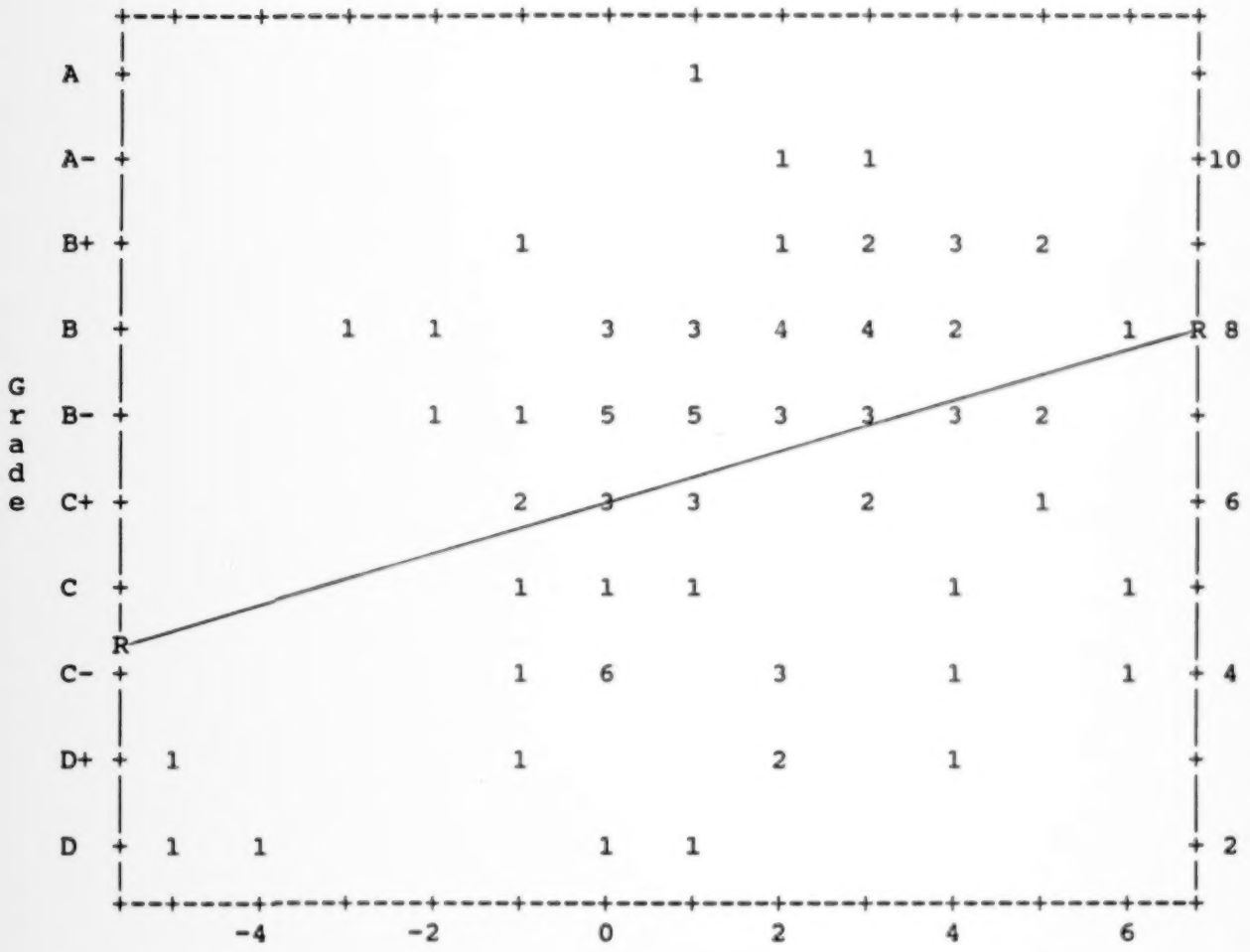
Regression statistics of Focus on Change in Confidence:

Correlation	.23	R Squared	.05	S.E. of Est	.81
Intercept(S.E.)	3.41 (.10)	Slope(S.E.)	.08(.04)	Sig.	.03

Plotting points represent number of subjects with corresponding value pairs.

Table 4

Change in Confidence Related to Grade



Change in Confidence

N=91

Regression statistics of Grade on Change in Confidence:

Correlation	.33	R Squared	.11	S.E. of Est	2.0
Intercept(S.E.)	6.00 (.25)	Slope(S.E.)	.30(.09)	Sig.	.00

Plotting points represent number of subjects with corresponding value pairs.

Table 5